ESO 25

MEAT DISTRIBUTION & CONSUMPTION

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The American consumer set new records in beef and poultry consumption in 1970, with an average consumption figure of 246 pounds. Consumers ate a total of 184.8 pounds of red meat per capita last year including 113.1 pounds of beef and 65.4 pounds of pork, setting record highs in total meat and in beef consumption and pushing per capita pork consumption down from 66 pounds in 1966. Consumption of 2.9 pounds of veal and 3.4 pounds of lamb was down slightly from a year earlier. Poultry consumption reached 49.6 pounds for another record year.

Beef continues to be the big gainer in red meats and when the 1969 consumption figure is compared to 1950 there is a 70 percent increase in consumption and a concurrent 25 percent increase in the average retail price. On the other side of the fence, chicken consumption moved from an average of 21.6 pounds in 1950 to 38.9 pounds in 1967 but this 80 percent gain in consumption was at a 30 percent reduction in retail price.

Consumption of pork for the same period of time was down one percent and was retailed at a 34 percent increase in average selling price.

Changes in Marketing Affect Values

To help explain the marked increase in retail selling price of pork one must look at some other rather striking changes in meat distribution during the same period of time. Marketing developments that have taken place since 1947 show a 225 percent increase for canned hams, 52 percent for other canned meats, 51 percent for sliced bacon, and increases of 45 percent and 90 percent for sausage products and ground beef.

Immediately after World War II there was a marked increase in the number of supermarkets and self-service meat departments. Also, changes in packaging and distribution techniques made it economically advantageous for the meat processor to use central processing and packaging, thus increasing the variety of marketed items. This together with broadened promotional activity, increased sales movement in these categories for the retailer.

The per capita pork consumption the last few years has been at a reduced rate due to the reduction in total pork available. This fall farm pork marketings increased about 14 percent and farm prices decreased 32 percent.

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* Sources: Progressive Grocer, April 1968; USDA Food Situation, Nov. 1969; Supermarketing, September 1969; Economic Information for Ohio Agriculture, January 1970.

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Meat Consumption in the Future

Meat will continue to enjoy gains in per capita consumption as our average family incomes continue to grow and as discretionary income increases. One constricting influence will be our ability to produce livestock at a pace matching population growth. With 3,000,000 persons being added each year to our population, we will have to produce an additional 663,000,000 pounds of carcass red meats and ready-to-eat poultry each year to keep pace with demand.

Considering population trends and livestock productivity, an estimate of per capita consumption in the years to come is as follows:

	1970	1975	1980
BEEF	110.0lbs.	120.0lbs.	130.0 lbs.
PORK	64.0	66.0	68.0
CHICKEN	40.0	43.0	47.0
TURKEY	9.0	10.0	12.0

This would be an increase by 1980 over 1965 of 25% for beef; 16% for pork; 40% for chicken and 60% for turkey. Total veal and lamb production will not gain.

Meat Changed its Character

Pork is leaner and meatier. Pork producers are gaining in their move for a leaner, meatier animal. Greatest evidence of this is the continued decline in the average number of pounds of lard per animal. Dropping from a figure of 32 pounds per animal to something less than 25 pounds is hard-fact proof of the advances made in the breeding and feeding of hogs.

As more and more meat type hogs came to market -- estimates varied from 35% to 45% of the total -- more and more pork loins weighing over 12 pounds were noted. At first the sorting of 12/14 loins was attempted by the packer. But supplies of 12/14 loins were soon outstripping customer demands. Late in 1967 the industry changed weight specifications on loins to "14 and down" rather than "12 and down". The transition was a smooth one.

PER CAPITA CONSUMPTION (in pounds)

YEAR	BEEF[1]	PORK[1]	CHICKEN[2]	TURKEY[2]
1945	59.4	66.6	21.6	3.5
1950	63.4	69.2	20.6	4.1
1955	82.0	66.8	21.3	5.0
1960	85.2	65.2	28.0	6.1
1961	88.0	62.2	30.0	7.4
1962	89.1	63.7	29.9	7.0
1963	94.6	65.6	30.7	6.8
1964	100.1	65.5	31.0	7.3
1965	99.6	58.8	33.3	7.5
1966	103.8	58.0	36.0	7,8
* 1967	105.6	62.8	37.5	8.8
**1970	110.0	64.0	40.0	9.0
**1975	120.0	68.0	43.0	10.0
**1980	130.0	70.0	47.0	12.0

[1] Based on carcass weight
[2] Ready-to-cook weight
*Preliminary
**Projected

Meat will continue to enjoy gains in per capita consumption as average family incomes continue to grow. With growth at the rate of 3,000,000 persons a year, to maintain our present rate of meat and poultry consumption will require an additional 663,000,000 pounds of carcass red meats and ready-to-eat poultry each year.

What Consumers Spend for Fresh & Cured Meat, Fish, Poultry
1968 Sales

Products	Value of Total Domestic Consumption	Amount Spent in Grocery Stores	% of Total Stores	% Grocery [a] to Total
	(add 000 to all dollar figures)			
Fresh & Cured Meat Fish, Poultry [b] ...	$29,623,200	$16,613,970	22.70	56
Fresh Fish & Other Fresh Seafood [b] ...	570,770	475,610	.65	84
Fresh Meat [b]	$17,921,930	$ 8,067,310	11.84	45
Beef	14,214,190	6,412,050	8.76	45
Lamb	494,190	440,820	.60	89
Pork	2,240,940	1,328,280	1.82	59
Veal	966,610	486,160	.67	50
Poultry [b]	$ 3,576,720	$ 1,935,850	2.69	56
Provisions	$ 7,551,780	$ 5,505,000	7.52	73
Packaged Bacon ...	1,330,900			
Cured Ham & Picnics	1,222,910			
Sausage & Sausage Products	2,746,210	5,505,000	7.52	73
Other Provisions	2,243,760			

[a] Refers to grocery stores and includes supermarkets. These are stores which do the major part of their business in dry groceries. Most of them have meat and produce departments. Excluded from this column (but included in the first column) are sales by such specialty food stores as delicatessens, dairy stores, bakeries, meat markets, fish markets, confectionary stores, fruit and vegetable markets, egg dealers.

[b] Quick frozen meat, fish and poultry included under "Frozen Foods."

SOURCE: Supermarketing, Vol. 24, No. 9, September 1969.

PER PERSON FOOD USE AND FAMILY INCOME, SPRING 1965

Family Income Group	All Food	Index of consumption Per Person		
		Beef	Pork	Chicken
U.S. Average	100	100	100	100
Under $1,000	82	66	97	102
$ 1,000 -$ 1,999	87	72	99	107
$ 2,000 - $ 2,999	88	76	99	96
$ 3,000 - $ 3,999	90	83	103	100
$ 4,000 - $ 4,999	97	95	101	106
$ 5,000 - $ 5,999	101	102	102	97
$ 6,000 - $ 6,999	102	108	101	101
$ 7,000 - $ 7,999	106	111	104	97
$ 8,000 - $ 8,999	106	114	99	96
$ 9,000 - $ 9,999	107	111	91	97
$10,000 - $15,000	112	114	97	100
Over $15,000	116	123	93	99

Source: Economic Information for Ohio Agriculture, No. 503, January, 1970

A growing problem is the merchandising of hams. The meat-type hog produces a heavier ham along with the loin but have not gained in customer appeal. Economists tell us that it takes an increasingly lower average selling price to move like tonnages of hams in every quarter of the year with the exception of the last quarter. During this last three-month period, the increased popularity of ham as a Thanksgiving and Christmas meat or gift item helps strengthen prices. But even during this time, the greatest demand is on the lightweight hams -- not those from meat-type hogs.

To create new markets for hams, we can expect packers to continue to search for new merchandising methods. With steady growth of new family units and the trend toward smaller families, smaller ham portions will become more important. The semi and boneless hams are a move in this direction.

Trim Has Changed Over the Years

Today's consumer is buying less fat and bone than her mother did a generation ago. Today, meat cuts are offered to the homemaker with less tail and flank meat; with only moderate amount of fat covering, and with less bone than in years past. Semiboneless and completly boneless cuts are gaining in popularity due to their ease in preparation and serving.

Even the nutrients found in meat have increased today vs. 25 years ago, according to research work done by Dr. Ruth Leverton at Oklahoma State University. These differences are primarily a result of the improved trim by packers and retailers.

Close trimmed and cleaned out pork loins continue to gain a greater share of the market. Many local and regional pork packers produce nothing but a close trimmed, "saw-ready" loin. Such a loin reduces instore trim time and is more uniform in sales value yield than is the run-of-the-mill, open market loin.

Government Controls on Industry

Wholesome Meat Act of 1967--The first major overhaul of the Meat Inspection Act of 1906 took place in December of 1967. After energetic support by the Government (felt by some to be a "smokescreen") the new regulations found themselves enacted as law.

The Act gives the states two years to come up to Federal standards for meat inspection. One additional year is available if the states are making strides in upgrading their laws at the time of the original deadline. If they don't meet Federal standards, the Federal Government has the right of jurisdiction. Already there has been a deluge of requests for Federal inspection and scores of establishments are trying to meet the standards.

For super market operators there is no general exemption under the new law and forthcoming interpretations will shed more light on its application to the stores themselves. An exception does stand for super markets so long as they sell only to the consumer. However, if a super market wishes to sell to a food service establishment or to school lunch programs, it appears he would have to have meats state or Federally inspected and approved. In Ohio, supermarkets' meat departments are inspected by the Ohio Dept. of Agriculture.

Standardization of Containers and Pallets

For years the meat industry has been attempting to standardize on sizes of shipping containers and pallets. A step in this direction is indicated by packer plans to ship pork butts and spareribs in boxes of uniform size and weight of contents.

For intra-industry shipments, the 48" x 40" pallet seems most popular. This would be for shipments from plant to plant and plant to warehouse. For shipments out of meat centers to stores, many companies will use a smaller but compatible pallet.

Standard Containers

While all carriers appear to be in unanimous agreement on the desirability of intermodal containers, there is also unanimous disagreement as to their desired characteristics. Understandably each wants container design to suit his particular needs.

Standard containers for intermodal transport, adopted by United States and International standard bodies, have 8-ft. by 8-ft. end sections and are, 40, 30, 20, 10, 6 2/3 or 5 ft. long. This allows them to fit together in modular form like building blocks. For the most part, container design for refrigerated perishables need only take into account the combined requirements of truck, rail and air.

Truck trailer sizes are set by state and Federal regulations. Container standards will have to take highway size and weight laws into consideration. Shippers and motor carriers feel certain that the legal width on the nation's highways will soon go to 8 1/2 ft. and that trailer containers will follow.

If air cargo is to be practical and reach its ultimate potential, containerized shipment is absolutely essential. For the movement of prepackaged meats it has the potential advantages of more rigid humidity and temperature control, less handling and damage, better logistics control and reduced time in transit.

Air Freight to Grow

Air freight, currently a small segment of the nation's cargo movement, is growing rapidly. It accounts for only one-tenth of one per cent of the nation's total freight traffic but has been increasing at a rate of about 25% annually in recent years. Cargo revenues currently account for 12% of total airline revenues and are expected to exceed 50% by 1980.

The economics inherent in air freight of perishables require self-refrigerated containerized shipment. The Air Transport Association has just completed one year of an experimental containerization program. Containerized air freight rates are averaging 40% below general air freight costs. Average freight revenue yield per ton-mile is 19.5¢ while under the container program, it is 11.6¢. Density averages 13.4 lbs./cu. ft. compared to other freight at 9 lbs.

One study reports that to transport 1 ton 1,000 miles by motor carrier would cost $33.17 in the central region of the United States. To carry the same amount in a DC-7 would be $100; in the 707-300C, $36.80, and based on preliminary estimates of Boeing's 747 now under construction, the cost would be $27.50. Air freight costs based on the jumbo jets are expected to be less than those for motor carriers. However, motor carriers will still be required to take the product to and from the air terminal facility. This added cost will be a major factor on high tonnage shipments.

Centralized Packaging

Rising labor costs in the meat department of retail chains have stimulated renewed attention to improvement of labor efficiency. Today, the backroom of a super market is a miniature meat-processing plant. As such it is an inefficient and costly place to break carcasses and fabricate consumer cuts. Inevitably high labor costs have forced the retailer to use as much labor-saving equipment as possible but the retailer has reached the point where further savings are almost nonexistent. There is today the added problem of a shortage of skilled meat cutters.

Many claim that irradiation or freezing, freeze-drying or some other process will be required to enable the industry to package meat centrally.

A centralized meat-packaging operation can make more efficient use of labor and equipment. Centralized packaging can also stimulate the design of equipment for mass production of consumer cuts and final packaging. This system can further reduce the costs of handling and distribution particularly of trimmings bone and other product not slated for consumer sale. A centralized packaging location can allow efficient processing of the by-products. Inventory control can be simplified by having most of the meat stored in one place and there should be less compulsion on the part of the meat manager to force cuts that have no place in a specific store. A centralized plant can standardize retail cuts.

By controlling the supply and production, certain cuts can be sent to the markets where there is the greatest demand.

The specific requirements for shelf life for centralized packaging operations are not known, Many opinions have been expressed by both experts and persons who have specific interests in mind. The estimate ranges from 3 days for ground beef to 14 days for red meats (including consumer storage) to up to 21 days if a meat packer performs the centralized packaging.

Some industry sources predict that centralized packaging will dominate the distribution system within 15 years. The only questions are where will the processing be done and who will do it. Using proper sanitation and temperature control, shelf life of seven days can now be expected. Under rigid controls this can be extended to twelve days.

More Meat Service Centers to Come

In 1965 there were approximately 129 meat distribution centers owned and operated by retailers. In 1970 this figure is over 200.
Rising costs of distribution, street and highway congestion and in-store expenses make it imperative to concentrate deliveries.

The American Meat Institute meat delivery study showed 24% of all store-door deliveries were of less than 100 pounds of product; 53% of all store-door deliveries were of less than 300 pounds of product. Stores averaged 23 deliveries per week. Some stores had as many as 54 deliveries per week. Conclusion: too many work interruptions.

Service Centers

Meat distribution centers of the future and remodelings of the old will make them truly "service centers." Their function and responsibility will extend beyond receiving and shipping to one of true "service". Such units will produce "saw-ready" beef cuts, further process the thin cuts, prepare the ground beef and produce preformed frozen patties and cuts -- and these are only a few of eventual activities.

These centers will be the forerunner of centralized packaging of fresh or frozen retail meat cuts. The advocates of meat service centers list quality control, reduced delivery costs, improved use of in-store labor, better inventory management and improved utilization of product as a partial list of tested and proved reasons for undertaking a meat center.

A large national chain has recently completed five new meat centers and several regional chains now have such units on the drawing boards. New ones or remodels are scheduled for Illinois, Michigan, Ohio, New Jersey, Iowa, Minnesota, New York and other states. In addition to corporate chains, many of the voluntary and co-op warehouses are studying the feasibility of such units.

Installations in California, Wisconsin, Illinois and Washington are being observed by interested groups. In the Los Angeles area only one major factor in the market is without a meat center.

Saw-ready Beef -- Most Notable Change Today

The advent of saw-ready retail primals has caused more discussion and action in the meat industry than any one thing since self-service meat was introduced.

The climate is now opportune for this handling practice to grow. There is the tight labor market at retail; operating costs continue to climb; equipment, space and real estate prices spiral, and the ability to further reduce costs at retail has plateaued. Operating within this economic climate, the retailer is diligently searching for new ways to handle product.

For years one of the national chains has distributed primal and subprimal beef cuts to its stores. Another chain shipped nothing but defatted and/or trimmed beef from its packing plant to distribution units.

In 1966 a Los Angeles chain took the process one step further to the saw-ready, vacuum-packed concept. Starting with a limited number of stores, they worked until the technique was refined and then initiated 100% distribution to their stores.

A growing number of packers are expanding their programs of retail saw-ready primals and an ever increasing tonnage of product is being moved in this manner. The food service industry was the first real packer customer interested in this process and still is the largest single-type buyer of the product from the meat packer.

The question as to who will prepare the saw-ready cuts -- packer or retailer -- will be answered by each individual company. There will be supporters for each program. But in the long run the greatest amount of production of such cuts will be done by the retailers.

They will want to exercise their control over supply, cutting methods and distribution. They will want, in most cases, to avoid dependence on a supplier for their primary needs. They will use the packer supplier for "fill-ins" as they do now with pork but the major portion will be their own production. From this experience base, they will be in a position to make the next step to central packaging much more quickly and efficiently.

The Future of Frozen Meats

The freezing of meat has often been mentioned as the possible answer to meat distribution problems. Some meat is frozen today and more will be frozen in the future. A Chicago-based chain has four outlets now selling frozen fresh meats, and a national packer is preparing to re-enter the market. The technol-

ogy for freezing meat is improving and will become better as the newer cryogenic systems become more acceptable.

One of the first barriers which frozen meats must overcome is the negative attitudes that some consumers and retailers have concerning its use. And there are other barriers, too. Although freezing offers the longest preservation time while retaining a desirable quality level, it is also the most expensive to initiate and the most expensive to maintain. Costs include the process of freezing, packaging to retard dehydration, storage conditions and facilities handling and transportation equipment.

Packaging Considerations

Packaging of meat for freezing presents some problems relative to color and moisture. One of the objections to frozen cuts of meat is that the color tends to be poor. Freezer burn, resulting from surface dehydration, leads to a whitening on the cut surface. Oxidation of the pigments in long-term storage allows the brown metmyoglobin to form. Frozen meats stored in the presence of visible light are subject to changes in pigment coloring and darken. Cavity ice, the result of fluctuating temperatures that allow evaporation of moisture from the body of the meat and its condensation on the interior surface of the package, is also a problem.

If the package is colder than the surrounding air, moisture from that air will condense on the package and whiten the outer surface. In prolonged periods of storage oxidation reactions can lead to blackening of the lean. If the freezing process is extremely fast the meat can have a purplish dark color that tends to darken even more in storage. Some freezing processes lead to a light color.

Packaging of meat after freezing is more difficult because the meat is cold and moisture can condense on it giving it a white appearance before it is even in the package. It is difficult to shrink a package around a piece of frozen meat because the shrinking process could lead to surface thawing.

Outlook for Frozen Meats

Despite its drawbacks and problems the frozen meat program will expand and the numbers of retailers utilizing it will grow. For the past five years a Southeastern chain has been buying nothing but dual-temp cases for its meat department. This is an indication of things to come. By 1975, a sufficient number of retailers will be merchandising fresh frozen meats that others will quickly follow their leadership and start programs of their own.

Freeze-drying, Irradiation

Freeze-drying, the process by which meat is dried by the sublimation of water under very high vacuum, produces dehydrated products which, when rehydrated, can have relatively good properties. The process is inherently expensive, since it remains a batch process requiring many hours to complete. Equipment for batch processing is at best expensive, and since there are no new principles of freeze-drying on the horizon, this is likely to remain an expensive processing method. The freeze-drying technique can be applied to a number of meat products that can be sold at higher prices. However, for the regular run of day-to-day meat items there is little promise of its use in the near future.

Irradiation of meat has been under study for well over 15 years, primarily by the U.S. Government and several of its agencies. The objective of the program originally was sterilization of meat. The more recent objective, when it was realized that red meat could not be sterilized without producing off-flavors, was to pasteurize the meat using ionizing radiation to extend its shelf life under refrigeration. However, off-flavors can also arise from the lower pasteurizing doses.

Recently, some additional attention has been paid toward irradiation pasteurization which would allow a refrigerated short-term life extension of 10 to 14 days similar to pasteurized milk. The best cost estimates available today range from 1 to 2.5¢ per pound.

Frozen meats, from a quality standard, consumer acceptance and relative costs would theoretically, at least, represent better alternatives than either irradiation or freeze-drying.

Environmental Control

Controlled atmosphere or the control of oxygen and carbon dioxide surrounding the meat has emerged as the most powerful supplemental tool in meat preservation. Controlled atmosphere will not stand alone any more than temperature, sanitation and relative humidity can stand alone. Controlled atmosphere is probably not even needed in a good system, but together with temperature and relative humidity control and good sanitation, it provides complete environmental control and the long-hoped-for prolonged shelf life.

The controlled atmosphere process can be either static or dynamic. Under the static condition, controlled atmosphere can be created and not altered, except by the action of the meat itself. If the process is dynamic, the atmosphere is continually monitored and controlled to assure a constant condition regardless of how the meat action alters the atmosphere. Both systems have been applied commercially: in vacuum packaging, in shipboard distribution of carcass beef, in railroad transportation of primal cuts, in warehouse storage and even in domestic refrigerator storage of consumer cuts.

The major drawback is color loss under controlled atmosphere and storage. Good red color, however, returns to desirable bright red after brief exposure to air.

Research work to date on controlled atmosphere by Dr. M.S. Pohja in Helsinki, Finland, under a grant from the USDA through PL 480 and the work of D.H. Killefer, W.S.Olgivy and J.C. Ayres indicate that a modified atmosphere such as CO_2 appears to offer the following desirable characteristics over air for maintenance of meat quality during storage and shipping:
1) Increased shelf life from 12 to 26 days for 40% CO_2 atmosphere and
2) Decreased bacterial growth.

To date, research reports on use of an atmosphere of N_2 do not appear to offer obvious advantages over an atmosphere of air as far as beef is concerned.